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Oil And Gas In Soviet Central Asia

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CENTRAL INTELLIGENCE AGENCY
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INTELLIGENCE REPORT

Oil And Gas In Soviet Central Asia

Introduction

The rate of increase in production from old established oil and gas fields in the European part of the USSR has been declining for several years. Depletion of these fields is a serious problem, as they have provided 80%-90% of national output of crude oil and natural gas and are located in the industrialized region of the country, where three-fourths of the petroleum is consumed. Efforts to increase reserves and production in these old fields have lagged because of wasteful recovery methods and the higher cost of drilling to greater depths. Domestic consumption has been growing rapidly and the USSR is counting heavily on exports of oil and gas now and in the future. To meet these demands the USSR is turning to new oil and gas deposits farther east.

The new oil and gas reserves discovered in recent years in Western Siberia and in Soviet Central Asia will make an important contribution to fuel supplies of the USSR. Although the Central Asian deposits are not as large as those in western Siberia, they are very substantial -- as large as those thus far discovered on the Alaskan north slope. The profitability of the Central Asian oil and gas, however, will depend on costs of production and transportation and on world market prices of oil and gas.

This report examines the magnitude of these Central Asian deposits, outlines problems of their development, and attempts to predict their future significance to the petroleum industry of the USSR.

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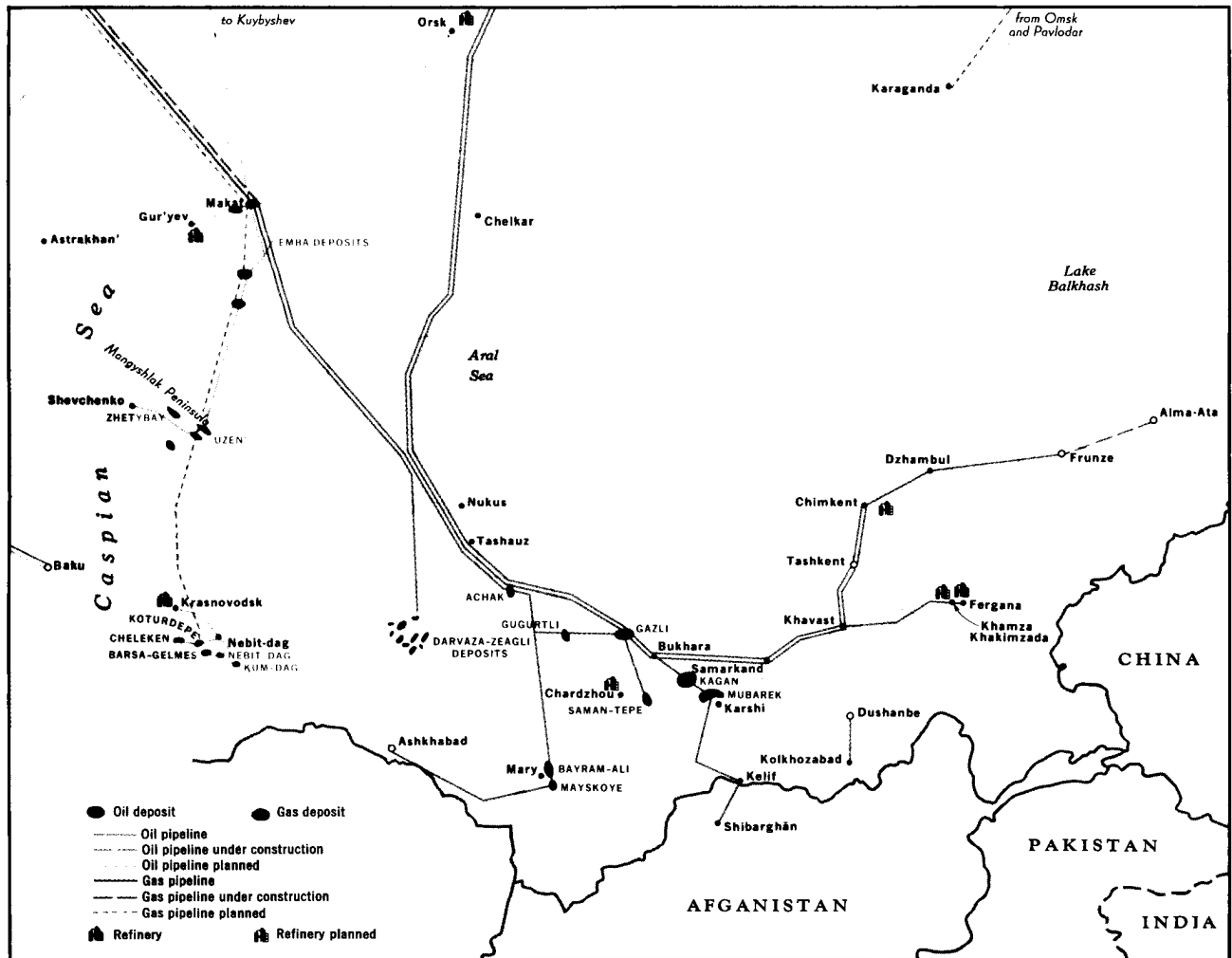
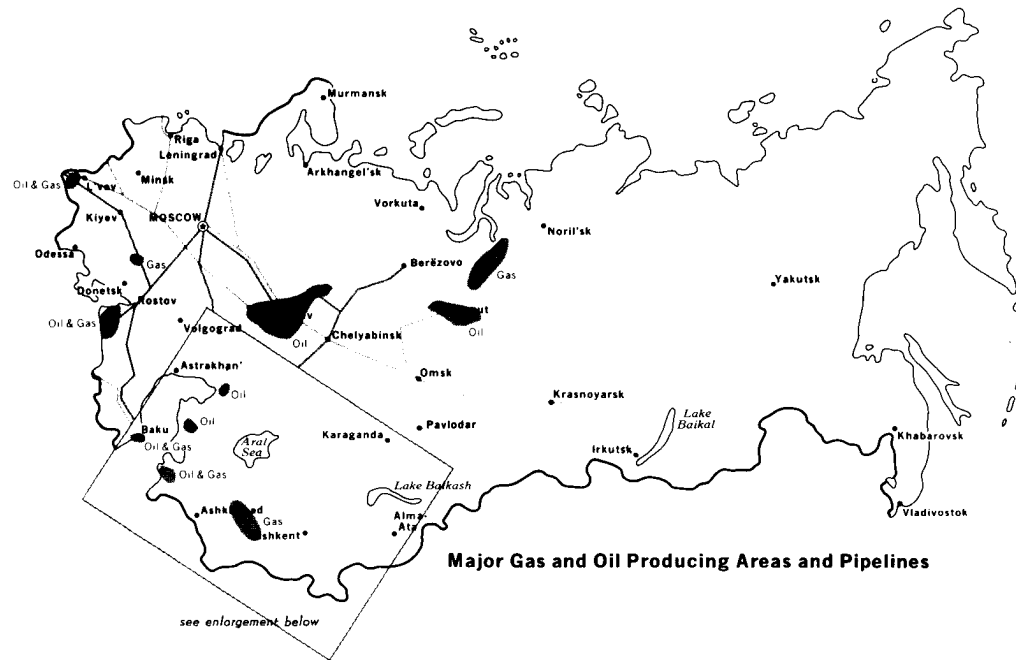
Reserves of Oil and Gas

1. Exploration for oil and gas in Central Asia has been under way for more than 80 years. Discovery of oil was reported in the Fergana Valley of eastern Uzbek SSR in the mid-1880s. It was not until 1956, however, that a major deposit of natural gas was discovered at Gazli near Bukhara in central Uzbek SSR. This deposit is now the second largest source of natural gas in the USSR. In 1962, important commercial deposits of crude oil were discovered on the Mangyshlak Peninsula in western Kazakh SSR. These fields, located at Uzen' and Zhetybay, may prove to be among the largest in the Soviet Union (see the map).

2. Exploratory drilling in recent years has confirmed the existence of more than 100 oil and gas deposits in western Kazakh and the Central Asian republics of Turkmen, Uzbek, Tadzhik, and Kirgiz. Approximately 90% of these crude oil reserves are concentrated near the eastern shore of the Caspian Sea in seven locations (Uzen', Zhetybay, Koturdepe, Barsa-Gelmes, Cheleken, Kum-Dag, and Nebit-Dag). The main gas deposits are much farther east, in western Turkmen and Uzbek SSR. About three-fourths of the gas reserves are concentrated in six locations (Gazli, Achak, Gugurtli, Saman-Tepe, Bayram-Ali, and Mayskoye). As of 1 January 1966, the last year for which reliable data on reserves are available, *proved* reserves of natural gas in Soviet Central Asia were reported to be about 620 billion cubic meters (cu m), about 30% of the total *proved* reserves in the USSR. Soviet experts indicate that by 1970 this area will contribute an additional 300 billion cu m of natural gas to *proved* reserves.

3. No data are published on reserves of crude oil in the USSR but the existence of more than 1 billion metric tons in the oilfields of western Kazakh and in the republics of Central Asia can be inferred from production goals. The recoverable reserves in the Mangyshlak Peninsula oilfields alone may be at least 800 million tons, about the same as those now estimated for Alaska's north slope. This level of reserves is implied by the recently announced production goals for the Mangyshlak fields of 35-40 million tons by 1975

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Petroleum in Soviet Central Asia

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and a predicted ratio of reserves to production of 20 to 1.

Exploration and Development

4. Geological conditions in much of Soviet Central Asia are highly favorable for the presence of major deposits of crude oil and natural gas, and in recent years their development has been proceeding at a rapid pace. During 1961-68, annual output of crude oil in the region increased by approximately 1.5 times, from 9 million metric tons per year to about 23 million, and production of natural gas increased by more than 40 times. The area's share in annual national output of natural gas rose from 2% in 1960 to 20% in 1968, when regional production reached 35 billion cu m.

5. By 1975, Soviet Central Asia is expected to be producing 65-70 million tons of crude oil annually, approximately 15% of national output, and some 100 billion cu m of natural gas, which will be at least one-third of total Soviet gas production in that year (see Table 1). Fulfillment of future production goals, however, will require increased investment in producing or importing modern seismic equipment and technology and rotary drilling equipment. More careful recovery methods will also have to be employed. Soviet seismic techniques and equipment have not proved very efficient in locating and accurately mapping new drillable structures in the thick sedimentary strata (up to 7,000 meters deep) and in the complexly faulted zones prevalent in this area. Lack of digital computers and recording equipment especially limits Soviet capability in seismograph exploration.

6. The USSR depends on the turbodrill for about 80% of total meters drilled annually. The turbodrill is particularly effective in shallow hard-rock strata such as those in the Urals-Volga area, but in the soft-rock formations found in Central Asia it is a poor tool, and its effectiveness rapidly decreases with depth. Penetration rates decrease at depths below 1,500 meters because of increased weight on the drill string, higher rock pressures and temperatures, and increased wear on the drill bits. At 3,000-meter

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Table 1
Production of Crude Oil and Natural Gas in Soviet Central Asia

Year	Crude Oil		Natural Gas	
	Production (Million Metric Tons)	Share of National Production (Percent)	Production (Billion Cu M)	Share of National Production (Percent)
1960	9.0	6	0.8	2
1965	13.8	6	17.9	14
1966	15.9	6	24.1	17
1967	19.7	7	29.4	18
1968	22.6	7	34.8	20
1969 plan	28.5	9	38-39	20-21
1970 plan	33-37	10-11	55-60	28-30
1975 plan	65-70	14-16	100	33-36
1980 plan	65-75	11-13	130	33-37

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depths the turbodrill is ineffective. In this area the Western rotary drilling techniques are more efficient and less expensive, but wider use of the rotary method is limited by shortages of high-quality drill pipe, tricone and diamond drill bits, high-pressure mud pumps, and blow-out preventors. Many of the deposits now being considered for future exploration and development are below the effective limits of the turbodrill. The depths of active and prospective production zones for extraction of crude oil and natural gas in the area are shown in the accompanying tabulation (in meters):

	<u>Active</u>	<u>Prospective</u>
Western Kazakh	800-2,280	1,000-7,000
Western Turkmen	500-2,900	500-6,000
Eastern Turkmen	1,300-2,300	500-3,500
Uzbek	700-2,275	600-4,000

7. The potential for annual oil recovery in the Mangyshlak fields was estimated by Soviet geologists at about 75-100 million tons in 1967-68, but the estimate was cut approximately in half in 1969 because of development difficulties. Not only the inability to drill to greater depths with existing Soviet equipment but also severe shortages of multizone producing equipment, wasteful flaring of associated gas which lowered well pressures, and the injection of unheated water that solidified the highly paraffinic oil in the producing zones contributed to the lowering of production goals.

Quality of Oil and Gas

8. The crude oil produced from the major oil-fields of the Mangyshlak Peninsula and western Turkmen has a high wax content and solidifies at temperatures up to 85° F. Special equipment is required to heat this oil during storage and in transit by railroad or pipeline, thus adding to costs of production and transport. Much of this crude oil also has a high salt content and must be desalted before being processed at refineries.

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Some modern secondary refining units -- catalytic reforming and hydrogen treating -- are necessary to obtain high-quality products from such crude oil. Many of the more prolific natural gas deposits in Uzbek SSR require special treating facilities to remove condensate, hydrogen sulfide, and carbon dioxide from the gas to prevent the accumulation of liquids and corrosive agents in gas pipelines.

Transportation and Distribution

9. The geographic location of Central Asian oil and gas resources will necessitate an expensive program for construction of long-distance pipelines to transport these fuels to major centers of consumption. The Soviet program for construction of pipelines in general is already lagging because too many lines have been started simultaneously and supplies of large-diameter line pipe, compressors, pumps, valves, and automated remote control equipment have been inadequate to meet demands. At present, about 19 billion cu m of natural gas are piped from Bukhara, in Uzbek, through two 40-inch lines more than 2,000 kilometers (km) to the Urals industrial center, and about 10 billion cu m through one 40-inch line to the Moscow-Leningrad area, a total distance of about 3,200 km. A second pipeline, with a diameter of 48 inches and a capacity of 15 billion cu m, is under construction from Bukhara to Moscow and is expected to be completed late in 1970. A gas pipeline network is being developed to serve the principal consuming areas of Uzbek, Kirgiz, and Tadzhik SSR's in Central Asia, as shown in the map and in Table 2.

10. At present there is no developed oil pipeline transportation system in Soviet Central Asia. Rail and water transport in the Mangyshlak Peninsula reportedly has a capacity to move more than 7 million tons of oil per year. There are several old small-diameter pipeline systems that serve the needs of the Krasnovodsk refinery in the western Turkmen SSR and the Gur'yev refinery in the vicinity of the Emba fields in Kazakh SSR. Only one crude-oil pipeline has been completed in recent years, a 21-inch line from the Uzen' fields to the Caspian port of Shevchenko, a distance of 140 km. A 40-inch line

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Table 2
Oil and Gas Pipelines in Soviet Central Asia

Origin	Terminus	Length (Kilometers)	Diameter (Inches)	Remarks
Crude oil				
Uzen', Kazakh SSR	Shevchenko, Kazakh SSR	140	21	Heated pipeline; completed in April 1968 with a capacity of 7 million tons per year.
Uzen', Kazakh SSR	Kuybyshev, Kuybyshev Oblast, RSFSR	1,700	40	Heated pipeline. Under construction; to be completed in 1970 with a capacity of 40 million tons per year.
Kum-Dag, Turkmen SSR	Chardzhou, Turkmen SSR	1,000	N.A.	Planned for construction during 1971-75.
Omsk, Omsk Oblast, RSFSR	Chimkent, Kazakh, SSR	1,200	N.A.	Planned to be built during 1971-75 to bring west Siberian oil to new refinery in eastern Kazakh SSR.
Kum-Dag, Turkmen SSR	Krasnovodsk, Turkmen SSR	200	12	Old pipelines to supply Krasnovodsk refinery.
Cheleken, Turkmen SSR	Krasnovodsk, Turkmen SSR	25-	12	
Gur'yev, Kazakh SSR	Orsk, Orenburg Oblast, RSFSR	1,700	12	Built in the middle 1950s to supply crude oil from Emba fields.

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Table 2
Oil and Gas Pipelines in Soviet Central Asia
(Continued)

Origin	Terminus	Length (Kilometers)	Diameter (Inches)	Remarks
Natural gas				
Bukhara, Uzbek SSR	Chelyabinsk, Chelyabinsk Oblast, RSFSR	1,950	40	Completed in 1964; supplying 9 billion cu m per year.
Bukhara, Uzbek SSR	Nizhniy Tagil, Sverdlovsk Oblast, RSFSR	2,340	40	Completed in 1966; supplying 10 billion cu m per year.
Bukhara, Uzbek SSR	Moscow-Leningrad	3,200	40	Completed in 1967; providing 10 billion cu m per year.
Bukhara, Uzbek SSR	Moscow	2,400	48	Under construction; to be completed in 1970; will supply 15 billion cu m annually.
Bukhara, Uzbek SSR	Moscow	2,400	56	Planned.
Bukhara, Uzbek SSR	Tashkent, Uzbek SSR	550	21	Completed in 1959 with a capacity of 2 billion cu m per year.
Mubarek, Uzbek SSR	Alma-Ata, Kazakh SSR	1,317	21-40 in various sections	Under construction; to be completed in 1970.
Bayram-Ali, Turkmen SSR	Ashkhabad, Turkmen SSR	500	21	Under construction; to be completed late in 1969.
Kuzyl Tumshuk, Tadzhik SSR	Dushanbe, Tadzhik SSR	175	12	Completed in 1963.
Kelif (Afghanistan)	Mubarek, Uzbek SSR	190	33	Completed in 1967 with a capacity of 4 billion cu m per year.

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under construction from the Uzen' oilfields to Gur'yev and Kuybyshev, a total length of about 1,700 km, is to be finished in 1970. Both of these pipelines are heated because of the high wax content of the crude oil from the Mangyshlak area.

Refining

11. Only four major refineries are in operation in Central Asia, at Krasnovodsk, Gur'yev, Fergana, and Khamza-Khakimzada. All are located near producing oilfields. Total capacity of these refineries is estimated at 20 million tons, whereas total crude oil production from this area at the end of 1968 was about 23 million tons. However, all of the 5 million tons of crude oil produced in the Mangyshlak Peninsula is transported out of the area for refining. The Gur'yev refinery, which is nearest to the Mangyshlak fields, lacks the facilities to process this type of crude oil, but is being expanded and modernized so that it can refine 2-3 million tons of Mangyshlak crude. Plans, however, call for most of the output from these fields (35-40 million tons by 1975) to be moved to Kuybyshev via the 40-inch pipeline now under construction. At Kuybyshev most of this oil probably will be blended with Urals-Volga crude oils and exported to Eastern Europe via the Friendship Pipeline. The Krasnovodsk refinery in Turkmen SSR is being enlarged and modernized to increase its output of products derived from crude oil from nearby oilfields. Some of the crude oil from the Turkmen fields is shipped by tanker across the Caspian Sea and refined at the Groznyy refinery. Refineries at Fergana and Khamza-Khakimzada in the eastern Uzbek SSR process the limited output from adjoining oilfields as well as some crude oil shipped in by rail from Turkmen fields. New refineries are planned to be built by 1975 at Chardzhou in the Turkmen SSR and at Chimkent in southern Kazakh to help satisfy the rising domestic demand for oil products. Preliminary indications are that Turkmen crude oil may be supplied by pipeline to the Chardzhou refinery and that crude oil from Tyumen' in western Siberia may be shipped by pipeline to the Chimkent refinery.

Significance to the Economy

12. Commercial production of petroleum in this region, as in western Siberia, came at a most

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propitious time. Growing domestic demands coupled with increasing export requirements have necessitated high rates of growth in production. It now appears that these large increments in production have been achieved at some sacrifice in total recovery. Recent evidence from Soviet technical publications indicates that serious problems exist at the major fields in the prolific Urals-Volga region. Included among the problems are water encroachment, declining reservoir pressures, delays in equipping oilfields, and extraction of crude oil at levels in excess of the maximum economic rate. Original national goals for production of crude oil and natural gas in 1970 and 1975 have been lowered in recent years as it has become apparent that the bulk of the increment in production will have to be provided by newly discovered fields.

13. Approximately one-third of the increment in total output of crude oil and natural gas in the USSR during 1969-75 is to be produced in Soviet Central Asia. Success in achieving this goal, however, will depend on increasing allocations of investment and on providing modern equipment and technology. For example, the cost of exploratory drilling with turbodrills in the deeper and more complicated structures of the Mangyshlak Peninsula is rising steadily, averaging about 150 rubles per meter, twice that in the Urals-Volga area. The availability of large-diameter line pipe will be an important factor in the ability to transport the oil and gas to major consuming centers. Much of this pipe may have to be obtained from the West, as domestic supplies do not appear to be adequate for the extensive national construction program planned.

14. Crude oil and natural gas produced in Central Asia can provide especially important benefits to the USSR in the period before the larger deposits of western Siberia reach full production. Maximum recovery of crude oil in Central Asia is expected in the mid-1970s, at a level of 65-70 million tons annually -- an amount equal to about 20% of present total national production. In western Siberia, production of 100 million tons annually is planned for the mid-1970s, and peak output -- probably more than 200 million tons per year -- is not expected before the early 1980s.

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The capability of the USSR to continue to export oil at or near the present level through 1975 may depend to a large degree on production of crude oil from Central Asia as growth in output from older major fields slows down.

15. Because of its high wax content, however, Central Asian oil probably will not be exported without prior blending with other oils to facilitate transport. When so blended it will help to satisfy the fuel requirements of the USSR and Eastern Europe and may free better quality Soviet oil for export to the Free World. The higher production and transport costs of Central Asian oil will raise the average cost of Soviet oil, thereby reducing the profitability of Soviet sales to the Free World, where prices are falling as a result of the discovery of extensive high-quality reserves. Exports to the Free World, however, will remain important to the USSR in spite of less favorable cost-price relationships, especially if large-diameter pipe and other needed equipment can be obtained through the sale of oil.

16. Natural gas from Central Asia, primarily from the Uzbek fields, will provide a significant share of the national supply of this important fuel and may facilitate Soviet export of gas to Western Europe before large gas pipelines can be completed from western Siberia. Some of the gas exported may actually come from Central Asia, but it is more probable that exports will come from deposits in the western part of the USSR and be replaced in the domestic supply partly by Central Asian gas and partly by low-cost gas to be imported from Iran and Afghanistan. Until recently, gas has been produced in Central Asia at costs below those prevalent elsewhere in the Soviet Union, but the cost of Central Asian gas is now rising. In view of the Soviet desire to export, this rising cost is unfortunate. As in the case of oil, world market prices for natural gas are falling as a result of the discovery of new reserves in the Free World and of lower costs for delivery by pipeline and by tanker. The possibility of obtaining large-diameter pipe for domestic Soviet oil and gas pipeline networks will, however, be a powerful incentive for the USSR to price its export gas competitively. Soviet efforts to promote

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the export of gas to Western Europe appear to be meeting with success, as evidenced by the recent agreement to supply West Germany with up to 3 billion cu m per year in exchange for large-diameter pipe.

Conclusions

17. Crude oil and natural gas from Soviet Central Asia will make an important contribution to the Soviet fuel supply, especially in the mid-1970s, before the fields of western Siberia reach peak production. Output of natural gas from Central Asia has risen rapidly and now accounts for at least one-fifth of total output, making it one of the most important gas producing areas in the USSR. If pipeline construction schedules can be met, rising production from this area will supply a significant part of the gas needed in the industrialized European area of the USSR by 1975 and could facilitate diversion of gas from other sources near the western border for export to Western Europe.

18. Crude oil produced in Central Asia now accounts for about 7% of total Soviet production, but the maximum level of output (65-70 million tons) is expected by 1975, at least five years before maximum production from the prolific deposits in western Siberia will be attained. Thus Central Asia can make an important contribution to satisfying rising domestic demands and to maintaining Soviet exports of oil as growth in production from older petroleum producing areas slows down. To achieve regional goals for production of oil and gas, however, the USSR will require modern technology and equipment and must allocate additional investment to cope with rising costs of exploration, development, and transport.

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